

REMARKS

Reconsideration and withdrawal of the rejections of the Office Action is respectfully requested in view of the remarks, amendments and enclosures herewith. Examiner Vincent is again thanked for the courtesies extended during the December 8, 2004 telephonic interview.

THE ART REJECTIONS ARE OVERCOME

THE REJECTIONS UNDER 35 U.S.C. §102

Claims 45-50 and 52-56 were rejected under 35 U.S.C. §102(b) as being allegedly anticipated by Hitachi (JP 56-5337). The rejection is respectfully traversed.

Initially, it is respectfully submitted that for a Section 102 rejection to stand, the single prior art reference must contain all of the elements of the claimed invention, *see Lewmar Marine Inc. v. Barient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987), and, the single prior art reference must contain an enabling disclosure, *see Chester v. Miller*, 15 U.S.P.Q.2d 1333, 1336 (Fed. Cir. 1990).

Initially, Applicants respectfully assert that the rejection is improper for the Office's failure to include a copy of Hitachi in its entirety, along with a full English translation thereof. Absent a full copy and translation, Applicants are forced to interpret Hitachi without full the full knowledge that would be available in the remainder of the document. For example, the Office Action utilizes the drawing that accompanies the English abstract in the rejection. However, the English abstract fails to include mention of all of the components of the drawings, forcing Applicants to interpret the drawing to the best of their ability without having the benefit of text of Hitachi.

The Office Action states that "Hitachi's apparatus was identical in structure to the claimed apparatus as it included a first central outlet 11', a second outlet 9', a third outlet 7' a precursor supply 1, an electrical supply 21, an annular electrode 23, a positioner 13, and a burner (9', 11' and 7' form a burner face)." Office Action at 2. Applicants respectfully disagree.

As admitted by the office action, the burner face comprises 9', 11' and 7'. As Applicants understand Hitachi, a gas entraining a spray of a liquid (1) is ignited and combusted at the mouth of the nozzle (11') through which the gas is delivered. As the nozzle (11') is an open, tubular section, the resulting flame manifestly cannot be annular as now required by the claimed invention. Furthermore, the Office Action's characterization of the burner face supports Applicant's contention that the resulting flame is not annular as a burner face necessarily implies

a flame across the entire face - in this instance, across 9', 11', and 7' - such that the flame cannot be annular.

Accordingly, Hitachi does not satisfy all of the elements of the pending claims, and the rejection based on Hitachi is improper. Reconsideration and withdrawal of the rejection under 35 U.S.C. §102(b) based on Hitachi is respectfully requested.

THE REJECTIONS UNDER 35 U.S.C. §103(a)

Claims 29-50 and 52-56 were also rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Choy et al (WO 97/21848) in view of Blackwell et al (US 6312656). Claims 29-44 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Choy et al. in view of Hitachi. Claim 51 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Choy et al. and Blackwell et al, and in further view of Japan 62-220376. And, claim 51 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Hitachi in view of Japan 62-220376. The rejections are respectfully traversed.

Initially, Applicants respectfully assert that in order to ground an obviousness rejection, there must be some teaching which would have provided the necessary incentive or motivation for modifying the reference's teaching. *In re Laskowski*, 12 U.S.P.Q. 2d 1397, 1399 (Fed. Cir. 1989); *In re Obukowitz*, 27 U.S.P.Q. 2d 1063 (B.P.A.I. 1993). Further, "obvious to try" is not the standard under 35 U.S.C. §103. *In re Fine*, 5 U.S.P.Q. 2d 1596, 1599 (Fed. Cir. 1988). And as stated by the Court in *In re Fritch*, 23 U.S.P.Q. 2d 1780, 1783-1784 (Fed. Cir. 1992): "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggests the desirability of the modification." Also, the Examiner is respectfully reminded that for the Section 103 rejection to be proper, both the suggestion of the claimed invention and the expectation of success must be founded in the prior art, and not Applicants' disclosure. *In re Dow*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988).

The instant invention is directed to, *inter alia*, methods of depositing material on a substrate, comprising the steps of delivering from a first outlet a stream of droplets of a precursor liquid towards a substrate; applying an electric field between the first outlet and the substrate; and delivering from a second outlet a flow of fuel about the stream of droplets such as to provide an annular flame combustion region between the first outlet and the substrate through which at least a portion of the stream of droplets passes before reaching the substrate, whereby the

precursor liquid is chemically reacted, or decomposed, or chemically reacted and decomposed, to provide the deposited material. The present invention is also directed to apparatus for depositing material on a substrate, comprising: a nozzle assembly including a first outlet from which a stream of droplets of a precursor liquid is in use delivered to a substrate, and a second outlet from which a flow of fuel is in use delivered such as to provide an annular flame combustion region through which at least a portion of the stream of droplets in use passes before reaching the substrate; a precursor supply for supplying a precursor liquid to the nozzle assembly; an electrical supply for applying an electric field between the first outlet and the substrate; and a burner for generating the flame of the annular flame combustion region between the first outlet and the substrate; whereby the precursor liquid is chemically reacted, or decomposed, or chemically reacted and decomposed, in the annular flame combustion region to provide the deposited material.

It is respectfully submitted that the combination of Choy *et al.* and Blackwell *et al.* do not render the present invention obvious, i.e. Choy *et al.* and Blackwell *et al.* do not combine to provide methods of depositing material on a substrate, comprising the steps of delivering from a first outlet a stream of droplets of a precursor liquid towards a substrate; applying an electric field between the first outlet and the substrate; and delivering from a second outlet a flow of fuel about the stream of droplets such as to provide an annular flame combustion region between the first outlet and the substrate through which at least a portion of the stream of droplets passes before reaching the substrate, whereby the precursor liquid is chemically reacted, or decomposed, or chemically reacted and decomposed, to provide the deposited material. Nor does such a combination provide an apparatus for depositing material on a substrate, comprising: a nozzle assembly including a first outlet from which a stream of droplets of a precursor liquid is in use delivered to a substrate, and a second outlet from which a flow of fuel is in use delivered such as to provide an annular flame combustion region through which at least a portion of the stream of droplets in use passes before reaching the substrate; a precursor supply for supplying a precursor liquid to the nozzle assembly; an electrical supply for applying an electric field between the first outlet and the substrate; and a burner for generating the flame of the annular flame combustion region between the first outlet and the substrate; whereby the precursor liquid is chemically reacted, or decomposed, or chemically reacted and decomposed, in the annular flame combustion region to provide the deposited material. Specifically, the rejection relies on

Blackwell *et al.* as disclosing the generation of an annular flame combustion region. Applicants again respectfully assert that this is not a correct reading of Blackwell *et al.*

The Office Action stated that Choy *et al.* does not show, “generating a flame from a burner coaxial with the droplet outlet,” and that Blackwell *et al.* shows, “combustion processes and apparatus for atomized liquid reactants wherein atomization can be done electrostatically.” Office Action at 4. Additionally, the Office Action continues that while Choy *et al.* does not show “the claimed sequence of annual gas jets,” Blackwell *et al.* shows the “use of inert shield gas between liquid precursor droplets and an outer, annular fuel gas jet.” Office Action at 4.

The Examiner was apparently alleging that fuel is delivered through an annular channel, namely, the outermost channel (47), and, as such, the flame combustion region (23) must necessarily be annular. It is submitted that this allegation has no basis.

While the Office Action was correct in stating that Blackwell *et al.* shows combustion processes, it was respectfully submitted that these combustion processes do not include the annular fuel gas jet alleged in the Office Action.

Rather, Blackwell *et al.* demonstrates the use of a single or multi-jet fuel source which gives rise to a single, continuous flame area. The Examiner is again respectfully invited to review figures 2-4 of Blackwell *et al.*, especially figure 4, which demonstrates that the burner (40) includes a number of concentric channels, but that the concentric channels provide a single, continuous flame area, not an annular flame combustion region as stated in the claims of the present invention.

In support of the allegation that Blackwell *et al.* does demonstrate an annular flame, the Office Action relies on the disclosure at column 9, lines 17 to 20, which states that “An inert gas, ... is delivered through channel 44 to inhibit reaction of liquid feedstock and soot build-up on burner face 53.” The Office Action considers this disclosure to support his allegation that the flame combustion region (23) is away from the burner face (53), and apparently in an annular region defined by the outermost channel (47).

It is, however, submitted that this teaching referenced in the Office Action in fact contrarily demonstrates that the flame combustion region (23) extends across the burner face (53), particularly the central region thereof which includes the atomizer (41) from which feedstock is delivered. The purpose of delivering an inert gas through an inner channel, namely, inner channel (44), is expressly recited as being to “inhibit reaction of the liquid feedstock and

soot build-up on burner face (53).” It is submitted that such inhibition at the burner face (53) is required for the very reason that the flame combustion region (23) extends thereover, as, otherwise, inhibition would be unnecessary, and, as such, and contrary to the Office Action’s allegation, this disclosure is not to the development of an annular flame combustion region (23).

Furthermore, the Examiner still alleges that a person skilled in the art would have been motivated to modify the apparatus and method of Choy *et al.* in accordance with the teaching of Blackwell *et al.* to utilize a combustion flame as the heating means for converting the precursor material. Appellants continue to disagree.

Choy *et al.* is directed to an apparatus and method which requires an increasing temperature gradient between the outlet (5) and the substrate (14), as disclosed in the summary of the invention at page 1, lines 22 to 30, particularly lines 29 and 30. It is important to recognize that Choy *et al.* does not merely require that an increased temperature be maintained between the outlet (5) and the substrate (14), but rather that an increasing temperature gradient be provided, and more specifically that the increasing temperature gradient be such that the precursor material undergoes de-composition and/or chemical reaction on or in very close proximity to the surface of the substrate (14), as summarized at page 8, lines 22 to 31. The provision of such a heating regime represents the main thrust of the teaching of Choy *et al.*, and, indeed, is disclosed at, for example, page 7, lines 22 and 23 as being the principle of the deposition technique of Choy *et al.*

Given that the teaching of Choy *et al.* is to a deposition technique which essentially requires such a heating regime, it is submitted that a person skilled in the art would have had no possible motivation to contemplate modifying the apparatus or method of Choy *et al.* in a manner which would have been contrary to the very teaching thereof, that is, to provide a heating regime which did not provide an increasing temperature gradient from the outlet (5) to the substrate (14), but contrarily provided for conversion of the precursor material at the outlet (5) and away from the substrate (14).

This notwithstanding, the applicant maintains that Blackwell *et al.* does not disclose the generation of an annular flame combustion region as alleged by the Examiner, and, combination with Choy *et al.* does nothing to remedy the deficiencies of Blackwell *et al.*

It is respectfully submitted that the combination of Choy *et al.* and Blackwell *et al.* do not render the present invention obvious, i.e. Choy *et al.* and Blackwell *et al.* do not combine to

provide methods of depositing material on a substrate, comprising the steps of delivering from a first outlet a stream of droplets of a precursor liquid towards a substrate; applying an electric field between the first outlet and the substrate; and delivering from a second outlet a flow of fuel about the stream of droplets such as to provide an annular flame combustion region between the first outlet and the substrate through which at least a portion of the stream of droplets passes before reaching the substrate, whereby the precursor liquid is chemically reacted, or decomposed, or chemically reacted and decomposed, to provide the deposited material. Accordingly, the rejection of the claims over Choy in view of Blackwell is improper and must be withdrawn.

Claim 51 was also rejected as allegedly unpatenable over Choy in view of Blackwell and JP '376. The Office Action alleged that it would have been obvious to use the mesh electrode of JP '376 in the arrangement of Choy and Blackwell. Even if one of skill in the art was to combine these references, the mesh electrode of JP '376 in combination with Choy and Blackwell would not result in the present invention.

Simply, in JP'376, the mesh electrode serves to create a corona discharge between two electrodes. In the present invention, the electric field is generated from high voltage source 45, and exists between the nozzle assembly 10 and substrate 50. The mesh of the present invention is not related to the presence of the electric field in any sense, and instead serves to "[assist] in removing soot from the flame". Specification at 3. Accordingly, none of Choy and or Blackwell, alone or in combination, including with the mesh electrode of JP '376 teach or suggest the present invention.

Claim 51 was also additionally rejected as allegedly unpatentable over Hitachi in view of JP '376. As discussed above, and contrary to the assertions in the Office Action, Hitachi fails to teach an annular flame. And, the failures of JP '376 as discussed above apply equally herein. Specifically, the mesh electrode in JP '376 is present to create the corona discharge. In the present invention, the electric field is generated separately, and the mesh "[assists] in removing soot from the flame". Specification at 3. Accordingly, even if there was motivation to combine the mesh electrode of JP '376 with Hitachi, the present invention would not be obtained.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §103 are respectfully requested in view of the remarks and enclosures herewith.

REQUEST FOR INTERVIEW

If any issue remains as an impediment to allowance, an interview with the Examiner and his supervisor, is respectfully requested, prior to issuance of any paper other than a Notice of Allowance; and, the Examiner is respectfully requested to contact the undersigned to arrange a mutually convenient time and manner for such an interview.

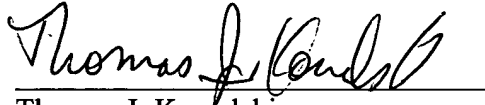
CONCLUSION

In light of the remarks and enclosures herewith, the application is in condition for allowance. Reconsideration and withdrawal of the rejections of the application, and prompt issuance of a Notice of Allowance, is respectfully requested.

Respectfully submitted,

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